GFK-0807D
March 2010

16 MHz, 32-Bit Expandable Central Processing Unit for IC66* Triple Modular Redundancy Systems

Features

- Single slot CPU.
- Supports 512 Kbytes of battery-backed expansion memory in the same slot. (Up to approximately 200 Kbytes available for user's application program and data)
- Up to 12K discrete inputs and outputs (any mix, simplex mode only); 2048 voted discrete inputs, 2048 voted discrete outputs

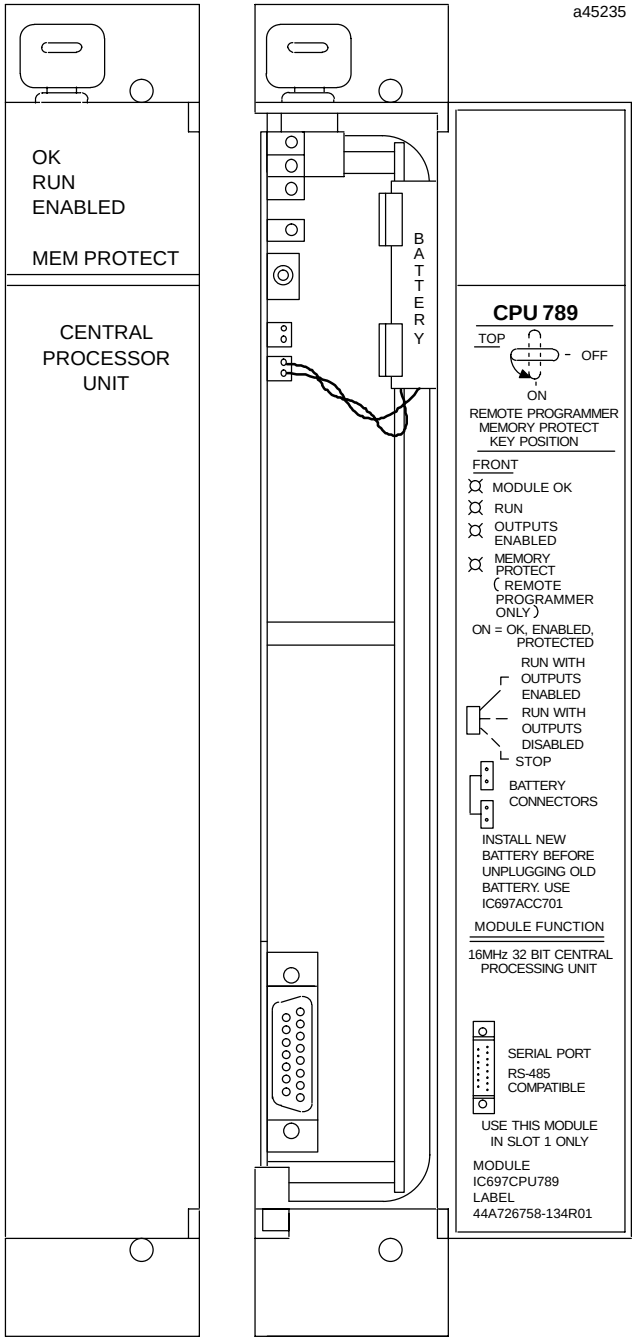
  Up to 8K analog inputs (simplex mode only) and 8K analog outputs (simplex mode only); 1024 voted analog inputs
- 0.4 microseconds per boolean function
- 16 MHz, 80386DX microprocessor
- Supports IC660 / IC661 I / O (and IC697 I / O in simplex mode only)
- Programmed by MS-DOS®, or Windows® software products running on Windows® 95 or Windows NT® over Ethernet TCP / IP or through the SNP port
- Configurable data and program memory
- Battery-backed calendar clock
- Three position operation mode switch
- Password controlled access
- Remote programmer keyswitch memory protection
- Four status LEDs
- Software configuration (No DIP switches or jumpers)
- Reference information inside front door.

Functions

The CPU 789 is a single slot programmable controller CPU which is programmed and configured by MS-DOS or Windows based programming software for use in Emergency Shut-Down (ESD), fire and gas, and other critical control applications. It communicates with I/O and smart option modules over the rack mounted backplane (IC697CHS750, 782, 783, 790, 791) by way of the VME C.1 Standard format.

The CPU 789 must be used in conjunction with a set of C program blocks which provide Triple Modular Redundancy (TMR) operating and autotest routines. It will not operate unless these program blocks are included in the loaded application program.

For detailed information on TMR systems, see Reference 4, the IC660 / 661 *Modular Redundancy Flexible Triple Modular Redundant (TMR) System User's Manual.*



® MS-DOS, Windows, Windows 95, and Windows NT are registered trademarks of Microsoft Corporation.

Supported option modules include IC697 LAN Interface modules, Programmable Coprocessor, Alphanumeric Display Coprocessor, Bus Controller for IC660/IC661 I/O products, Communications modules, I/O Link Interface, and all of the IC697 family of discrete and analog I/O modules.

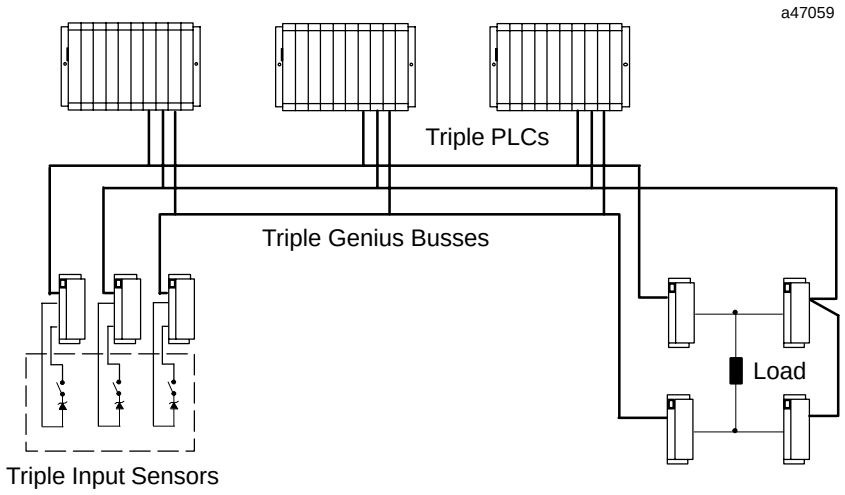


Figure 1. Typical GMR System Configuration

User Memory

Program and data memory for the CPU 789 is available by attaching an expansion memory board with 512 Kbytes battery-backed CMOS RAM. Up to approximately 200 Kbytes of this memory is available for the user application program and data.

Operation, Protection, and Module Status

Operation of this module may be controlled by the three-position RUN / STOP switch or remotely by an attached programmer and IC641 software. Program and configuration data can be locked through software passwords or manually by the memory protect keyswitch. When the key is in the *protected* position, program and configuration data can only be changed by a programmer connected parallel only (that is, via the Bus Transmitter module). The status of a CPU is indicated by the four green LEDs on the front of the module.

Installation

It is the responsibility of the OEM, system integrator, or end user to properly install the PLC equipment for safe and reliable operation. Product manuals provide detailed information about installation, startup, and proper use of the PLC equipment. The installation manual, shipped with your PLC programming software, describes how to properly install the equipment. If the PLC installation must comply with supported standards, such as FCC or CE Directives, please refer to the *Installation Requirements for Conformance to Standards*, shipped with the PLC programming software, for additional guidelines.

- Installation should not be attempted without referring to the applicable programmable controller hardware installation manual.
- Align the expansion memory and CPU connectors.
- Align the captive screws on the memory board with the standoffs already installed on the CPU.
- Push the memory board onto the CPU connector ensuring the mating screws remain aligned with their respective standoff.
- Screw each memory board screw into the standoffs with a #1 Phillips screwdriver, firmly tighten each.
- Connect the battery to either of the battery connectors on the module.
- Put toggle switch in the STOP position.
- Put keyswitch in Memory Protection OFF position.
- Make sure rack power is off.
- Install in slot 1 of rack 0.
- Turn on power.

16 MHz, 32-Bit Expandable Central Processing Unit for IC66* Triple Modular Redundancy Systems

GFK-0807D
March 2010

The module should power up and blink the top LED. When the diagnostics have completed successfully, the top LED stays on and the second and third LEDs are off. The fourth LED is off if the keyswitch is in the OFF position. The CPU is now ready to be programmed (if connected parallel, the CPU can be programmed regardless of key position). After the program has been verified the toggle switch may be moved to the appropriate operation mode position. The LEDs indicate the position of the toggle switch, memory protection status, and the state of the program.

Expansion Memory

The CPU 789 must have a CMOS RAM expansion memory board. The CMOS expansion memory board provides CMOS RAM memory of 512 Kbytes. Up to approximately 200 Kbytes of this memory is available for the user application program and data. The battery which supports this memory is located on the main CPU board housing.

Installation of a CMOS expansion memory board on the CPU will require initialization of the CPU with the programmer (See Reference 2).

Programmer Connection, Parallel

For a parallel interface (MS-DOS programmer only) the programmer is connected to the top port on the Bus Transmitter Module (IC697BEM713). Consult Reference 1 for a description of programming functions.

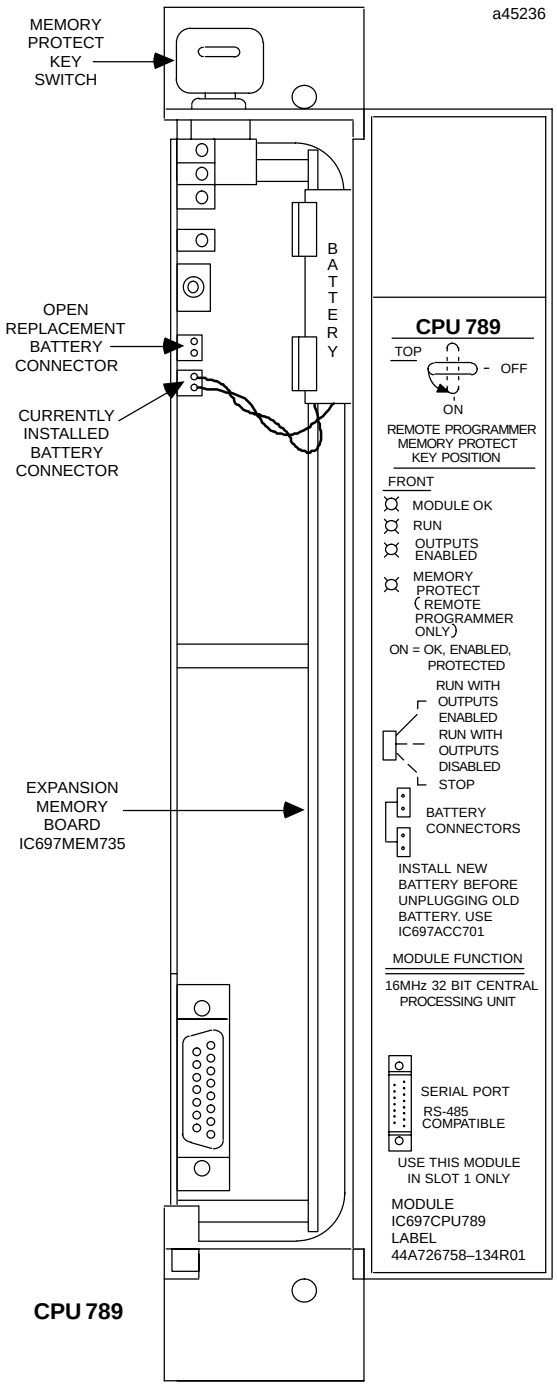


Figure 2. CPU 789 - Location of Major Features

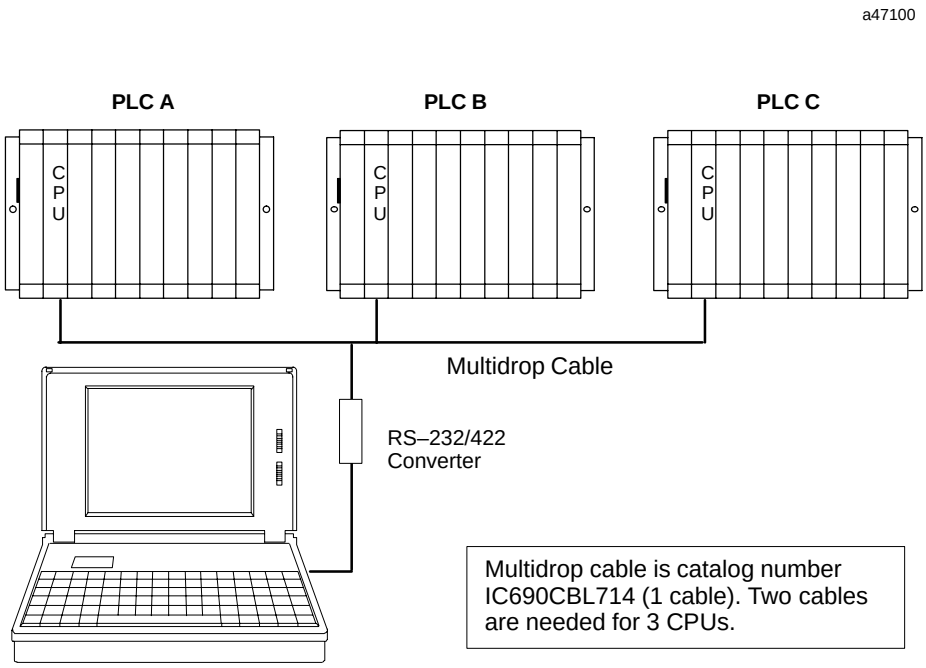


Figure 3. System Configuration, Serial Connection to Programmer

Serial Port

The 15-pin D-connector provides the connection to an RS-485 compatible serial port on the CPU as shown in Figure 3. This port provides a serial connection to a Work Station Interface board installed in the programming computer.

The serial connection can also be made from the serial port on the CPU to the serial port on the programming computer, or other serial device, through the RS-422 / RS-485 to RS-232 Converter (IC690ACC900) or RS-232 to RS-422 Miniconverter (IC690ACC901). This connection can be made with available cables or you may build cables to fit the needs of your particular application. For more information on serial communications, see reference 3.

For more detailed information on configuration of TMR systems and communications between PLCs in the system, refer to the *Modular Redundancy Flexible Triple Modular Redundant (TMR) System User's Manual.*

Programmer Connection, Ethernet TCP/IP

Connecting your programmer via an Ethernet TCP / IP network requires installation of an Ethernet Interface module in the PLC. This can be either the Ethernet Controller, IC697CMM741, or Ethernet Interface (Type 2), IC697CMM742. Before connecting your programmer and PLC to the Ethernet TCP / IP network you must set the IP address in the Ethernet Interface. After setting the IP address, connect the PLC and the programmer running Windows software to the Ethernet Interface.

For more detailed information on Ethernet TCP / IP, refer to the *TCP/IP Ethernet Communications (Type 2) User's Manual,* and the Windows programming manual, GFK-1295.

16 MHz, 32-Bit Expandable Central Processing Unit for IC66* Triple Modular Redundancy Systems

GFK-0807D
March 2010

Configuration

The IC697 CPU and I/O system is configured with MS-DOS or Windows based programming software. There are no DIP switches or jumpers used to configure the system. The CPU verifies the actual module and rack configuration at power-up and periodically during operation. The actual configuration must be the same as the programmed configuration. Deviations are reported to the CPU alarm processor function for configured fault response. Consult Reference 1 for a description of configuration functions.

Battery

A lithium battery (IC697ACC701) is installed as shown in Figure 2. This battery maintains program and data memory when power is removed and operates the calendar clock. Be sure to install the new battery before removing the old battery. If during power-up diagnostics a low battery is detected the Module OK LED (top) will not stay on. Specific indication of a low battery state is detailed in Reference 2.

Removing a Module

The instructions below should be followed when removing a module from its slot in a rack.

- Grasp the board firmly at the top and bottom of the board cover with your thumbs on the front of the cover and your fingers on the plastic clips on the back of the cover.
- Squeeze the rack clips on the back of the cover with your fingers to disengage the clip from the rack rail and pull the board firmly to remove it from the backplane connector.
- Slide the board along the card guide and remove it from the rack.

Table 1. References

Reference	Title
1	Programming Software User's Manual
2	Programmable Controller Reference Manual
3	Programmable Controller Installation Manual
4	IC66* Modular Redundancy Flexible Triple Modular Redundant (TMR) System User's Manual

Table 2. Specifications for IC697CPU789 †

Battery	
Shelf life	10 years at 20° C (68° F)
Memory retention	6 months nominal without applied power.
Current required from 5V bus	1.6 Amps (includes expansion memory board)
Time of Day Clock accuracy	" 3.5 seconds per day maximum
Elapsed Time Clock (internal timing) accuracy	" .01% maximum
Serial Port	
RS422/485 compatible	Programmer Serial Attachment
VME	System designed to support the VME standard C.1

† Refer to GFK-0867B, or later for product standards and general specifications.

Table 3. Ordering Information

Description	Catalog Number
Central Processor Unit, CPU 789 16 MHz, 32 Bit, Expandable for IC660/IC661 Triple Modular Redundancy Systems	IC697CPU789
512 Kbyte, 32-Bit CMOS Expansion Memory	IC697MEM735
Lithium Battery	IC697ACC701

Note: For Conformal Coat option, or Low Temperature Testing option please consult the factory for price and availability.